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PROGRAM IMPLEMENTATION PLAN (PIP)

FOR

THE COOPERATION BETWEEN NOAA AND EUMETSAT

ON

AN INITIAL JOINT POLAR-ORBITING OPERATIONAL

SATELLITE SYSTEM

This Program Implementation Plan for the Cooperation between NOAA and EUMETSAT has been agreed by the parties and signed

at *Darmstadt, Germany* on *8 July 1999*

For NOAA



Michael Mignogno

Michael Mignogno
NOAA POES Program Manager

For EUMETSAT

Marc Cohen

Marc Cohen
EPS Programme Manager

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DOCUMENT CHANGE RECORD

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1 HIGHER LEVEL DOCUMENTATION

1.1 Authorizing documentation

Agreement between the United States National Oceanic and Atmospheric Administration (NOAA) and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) on an Initial Joint Polar-orbiting Operational Satellite System (IJPS), signed 19 November 1998.

1.2 Exchanged letters

NOAA letter on Level Playing Field dated 19 November 1998
EUMETSAT letter on Level Playing Field dated 19 November 1998

NOAA letter on Intellectual Property Rights dated 19 November 1998
EUMETSAT letter on Intellectual Property Rights dated 19 November 1998

EUMETSAT letter on Cooperating States dated 19 November 1998
NOAA letter on Cooperating States dated 19 November 1998



EUMETSAT letter on Back-up Command and Data Acquisition (CDA) Ground Station dated 19 November 1998
NOAA letter on Backup Command and Data Acquisition (CDA) Ground Station 19 November 1998

EUMETSAT letter on Data Denial Implementation dated 19 November 1998
NOAA letter on Data Denial Implementation dated 19 November 1998

NOAA/NESDIS letter on Side letters to the IJPS Agreement related to Command and Data Acquisition (CDA) Ground Station and data Denial dated 19 November 1998
EUMETSAT letter on Data Denial Work Plan dated 19 November 1998
EUMETSAT letter on EUMETSAT EPS Backup Capability dated 19 November 1998

1.3 Data Denial documentation

Data Denial Implementation Plan is approved by NOAA and EUMETSAT Senior Executive Management (To be Completed).

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2 INTRODUCTION

2.1 Scope and Purpose

This document constitutes the Program Implementation Plan (PIP) called upon by the Agreement between the United States (U.S.) National Oceanic and Atmospheric Administration (NOAA) and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) on an Initial Joint Polar-orbiting Operational Satellite System (IJPS).



This plan covers the system associated with the NOAA-N, NOAA-N', METOP-1, and METOP-2 satellites.

In case of conflict between this PIP and the Agreement, the Agreement shall take precedence. Issues requiring interpretation / resolution will be brought to the attention of the Program Managers.

2.2 Document Structure

This PIP contains:

- in Section 2, the IJPS mission objectives;
- in Section 3, the system description;
- in Sections 4, the responsibilities of the parties
- in Sections 5 and 6 the deliverables, tasks and services
- in Section 7, the program management and configuration control processes
- in Section 8, the administrative processes
- in the appendices, the IJPS key planning dates, glossary, coordinated baseline documentation, deliverables and acronyms.

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2.3 Background

Meteorological satellite data from polar orbit have been freely provided by the U.S. to the rest of the world for more than thirty years, and on a fully operational basis for more than two decades. The existing service is provided by NOAA, using data from two operational satellites in sun-synchronous, polar orbits: one in a morning orbit (at a nominal altitude of 833 km, with a descending equatorial crossing-time of approximately 07:30) and the other in an afternoon orbit (at a nominal altitude of 870 km, with an ascending equatorial crossing-time of approximately 13:40). NOAA is committed to continue to provide data coverage from both orbits through the year 2000, after which time EUMETSAT plans to assume responsibility for a mid-morning orbit service. NOAA will continue to be responsible for the afternoon orbit service. This will result in a joint polar system, the responsibility and costs of which will be more equitably divided between Europe and the United States.

2.4 IJPS Mission Objectives

2.4.1 General

The general objective of the IJPS is to collect, exchange, and disseminate to users global environmental data to support operational meteorological and environmental forecasting and global climate monitoring. The core IJPS missions and services are outlined below, the primary ones being the global sounding and imagery missions.

2.4.2 Missions

2.4.2.1 Global Sounding



The global sounding mission provides vertical profiles of temperature and humidity to support numerical forecasting models.

2.4.2.2 Global Imagery

The global imagery mission provides cloud imagery for forecasting applications, sea surface temperatures, vegetation index monitoring, snow cover, sea ice extent, aerosols and radiation budget parameters. It also supports the global sounding mission through the identification of cloud free areas.

2.4.2.3 Wind Scatterometry

The wind scatterometry mission provides speed and direction of winds at the ocean surface.

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2.4.2.4 Climate Monitoring

The climate monitoring mission provides, inter alia, information from imagery and sounding, sea ice coverage information, ozone observations.

2.4.2.5 Data Collection and Location

The data collection and location mission supports the activities of the World Weather Watch (WWW) of the World Meteorological Organisation (WMO) by receiving and disseminating in situ observations from ocean buoys and other similar data collection platforms.

2.4.2.6 Search and Rescue (S&R)

The search and rescue mission supports the provisions of the location of emergency beacons to rescue forces worldwide.

2.4.2.7 Space Environment Monitoring

The Space Environment Monitoring mission provides information on the solar terrestrial environment to include solar flux, energetic particle density and magnetic field parameters.

2.4.3 Data Access

2.4.3.1 Global Data Access

To support global scale forecasts, global data and products are made available to the meteorological services.



2.4.3.2 Local Data Access

Data are broadcast in real-time for reception by local receiving stations, during a satellite overpass, for the support of analysis and forecasting activities.

2.5 Framework for the Initial Joint Polar-orbiting System

2.5.1 General

The IJPS will be a joint European / U.S. endeavor, with EUMETSAT assuming responsibility for the "mid-morning" orbit and NOAA being responsible for the "afternoon" orbit. To maintain compatibility, the operational meteorological payload will, as far as possible, be common to both the "mid-morning" and "afternoon" spacecraft. Furthermore, the respective NOAA and EUMETSAT Ground Segments will, as far as possible, be compatible regarding data exchange and processing.

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2.5.1.1 Instruments provided by NOAA

The common payload instruments to be provided by NOAA for the NOAA and EUMETSAT satellites consists of the:

- Advanced Very High Resolution Radiometer (AVHRR)
- High-Resolution Infrared Sounder (HIRS)
- Advanced Microwave Sounding Unit (AMSU-A)
- Space Environment Monitor (SEM)
- Satellite-Aided Search and Rescue (SARSAT) System, in cooperation with Canada and France

The additional payload instrument to be provided by NOAA for the NOAA spacecraft is the Solar Backscatter Ultra Violet (SBUV) instrument.

2.5.1.2 Instruments provided by EUMETSAT



The common payload instrument to be provided by EUMETSAT for the NOAA and EUMETSAT spacecraft is the Microwave Humidity Sounder (MHS).

The additional payload instruments to be provided by EUMETSAT for flight on the EUMETSAT spacecraft consist of the:

- Infrared Atmospheric Sounding Interferometer (IASI)
- Advanced Scatterometer (ASCAT)
- Ozone Monitoring Instrument implemented by the Global Ozone Monitoring Experiment (GOME-2).
- Global Positioning System-Sounder implemented by the Global navigation satellite system Receiver for Atmospheric Sounding (GRAS)

2.5.1.3 Instruments provided to NOAA and EUMETSAT



The Data Collection and Location System, which is a common payload instrument, is provided by CNES to NOAA for flight on NOAA-N (ARGOS/2) and NOAA-N' (A-DCS). CNES also provides A-DCS to EUMETSAT for flight on METOP-1 and METOP-2.

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2.5.2 Development Framework

EUMETSAT is working together with the European Space Agency (ESA) to establish a METeorological OPERational (METOP) series of spacecraft, which will comprise the Space Segment of the EUMETSAT Polar System (EPS). METOP is designed to be an operational meteorological spacecraft accommodating the common instruments referenced in sections 2.5.1.1 to 2.5.1.3 above. The atmospheric sounding capability of METOP satellites will be upgraded by the introduction of an IASI advanced infrared sounder, being developed jointly by CNES and EUMETSAT. The first spacecraft of this series, METOP-1, is planned for launch in mid-2003, with the second, METOP-2, planned to be launched in line with operational needs.

NOAA is currently producing its latest generation of meteorological spacecraft, NOAA-K, L, M, N and N' that will accommodate the instruments referenced in sections 2.5.1.1 to 2.5.1.3 above. NOAA N is planned to be launched in approximately the same timeframe as METOP-1.

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3 SYSTEM DESCRIPTION

3.1 General



To fulfil the objectives of the cooperation laid down in the IJPS Agreement, the IJPS consists of the following elements:

- a Space Segment composed of:
 - a series of two spacecraft flown consecutively in an orbit with an afternoon equatorial crossing time (ascending node), NOAA-N and NOAA- N';
 - a series of two spacecraft flown consecutively in an orbit with a mid-morning equatorial crossing time (descending node), METOP-1 and METOP-2;
 - a set of common instruments to be flown on both the mid-morning and the afternoon spacecraft,
 - a set of additional instruments specific for each orbit.
- a NOAA and a EUMETSAT Ground Segment comprising each:
 - at least one Satellite Control Centre and a geographically separate back up;
 - at least one Command and Data Acquisition (CDA) ground station and a geographically separate back up;
 - at least one Data Processing, Distribution and Archive Facility;
 - telecommunications capabilities between NOAA and EUMETSAT necessary to ensure the timely and reliable exchange of telemetry and data as defined further in section 3.6.

Note: The term spacecraft refers to the space vehicle carrying an instrument set (or payload). The term satellite refers to the spacecraft and its payload.

Each spacecraft shall provide for:

- the recording and the read-out of all the science data generated by the common instruments and additional payloads and other onboard data needed to process this science data;
- the direct broadcast to world-wide local users of the science data generated by the IJPS instruments at high resolution (High Resolution Picture Transmission) and at low resolution (Automatic Picture Transmission, APT or Low Resolution Picture Transmission, LRPT);
- housekeeping telemetry and telecommand capabilities.



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3.2 Instrumentation

3.2.1 IJPS Common Instrumentation

The instrument set to be carried on both the mid-morning and the afternoon spacecraft shall consists of:

INSTRUMENT	INSTRUMENT TYPE	Specification Document
AVHRR/3 Advanced Very High Resolution Radiometer	Imaging radiometer with six channels in the range 0.6-12 microns.	RDN20
HIRS/4 High resolution Infra-Red Sounder	Sounder with 19 infrared channels in the range 3-15 microns, and one visible channel.	RDN21
AMSU-A1/-A2 Advanced Microwave Sounding Unit-A	Microwave sounder with 15 channels in the range 23-90 GHz.	RDN22
MHS Microwave Humidity Sounder	Microwave sounder with five channels at 89, 157 and around 183 GHz.	RDE20
ARGOS/2 Data Collection System (NOAA-N only)	UHF receiver and signal processor.	RDN27
A-DCS Data Collection System	UHF receiver and signal processor.	RDN28 RDE22
S&R / SARP-2 (SARSAT) Search & Rescue Processor (NOAA-N only)	UHF receiver and signal processor.	RDN26
S&R / SARP-3 (SARSAT) Search & Rescue Processor	UHF receiver and signal processor.	RDN15
S&R / SARR(SARSAT) Search & Rescue Repeater	VHF / UHF / L-Band Transponder	RDN26
SEM/2 Space Environment Monitor	Multi-channel charged-particle spectrometer.	RDN23

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3.2.2 Mid-Morning Spacecraft Additional Payload



The mid-morning spacecraft shall embark the following additional instruments:

INSTRUMENT	INSTRUMENT TYPE	Specification Document
IASI Infrared Atmospheric Sounding Interferometer	Infrared Michelson Interferometer covering the 3.4-15.5 micron range.	RD23
ASCAT Advanced Scatterometer	Pulsed C-band radar.	RDE24
GRAS Global navigation satellite system Receiver for Atmospheric Sounding	Radio Occultation Receiver.	RDE25
GOME-2 Global Ozone Monitoring Experiment	Nadir-viewing spectrometer.	RDE26

3.2.3 Afternoon Spacecraft Additional Payload

The afternoon spacecraft shall embark the following additional instruments:

INSTRUMENT	INSTRUMENT TYPE	Specification Document
SBUV / 2 Solar Backscatter Ultra-Violet Spectral Radiometer	Spectral Radiometer with 12 channels in the range 252.0-322.3 nm (discrete mode) and 160-400 nm (scan mode).	RDN24

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3.3 Orbital Characteristics

The IJPS shall exhibit the following orbital characteristics:

PARAMETER	MID-MORNING S/C	AFTERNOON S/C
Mean Solar Local Time at Equatorial Crossing	Descending node: 09:30	Ascending node: 14:00
Tolerance	± 5 min	+/- 30 min from launch (uncontrolled)
Mean altitude	834.5 km	870 km
Others	to ensure sun-synchronism	to ensure sun-synchronism

3.4 System Requirements

The system requirements for the mid-morning spacecraft and its ground segment is given in [RDE 14].

The system requirements for the afternoon spacecraft and its ground segment are given in [RDN 4].

3.5 Downlink requirements

3.5.1 Telemetry and Housekeeping



Requirements for the NOAA and METOP satellites telemetry data are defined in [RDN 18] and [RDE 19] respectively.

3.5.2 Stored Data

Requirements for the recorded data on the NOAA and METOP satellites are defined [RDN 18] and [RDE 19] respectively.

3.5.3 Direct Broadcast Requirements

The NOAA-N, N' spacecraft will provide direct broadcast services using the existing APT and HRPT links as defined in [RDN 18].

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The METOP-1 and METOP -2 spacecraft will provide direct broadcast services using jointly agreed standards as defined in [CBD 22].

The METOP-1 and METOP-2 spacecraft will be built with the capability to allow for clear transmission or selective (i.e. per group of instrument, per users) encryption of the LRPT and HRPT data, as per [RDE 27]. This encryption capability will be used to implement EUMETSAT data policy as set forth in the IJPS Agreement, and will enable the data denial capability as set forth in the IJPS Agreement and the Data Denial Implementation Plan (DDIP) as per section 1.3.

3.6 Ground Segment Requirements

The governing documents for this section are the Joint Operations Rules and Procedures [CBD 10], the Interface Requirements Documents [CBD 3, CBD 4] and the Ground Segment Interface Control Document [CBD 23].

3.6.1 Satellite Operations

3.6.1.1 General



The operational phase of the IJPS satellites will start upon successful completion of the System Commissioning Review (SCR) for the METOP satellites and On-orbit Verification Review for the NOAA satellites.

Each Party shall control its own satellites, including the instruments they carry, regardless of their origin. Day to day operations and anomaly resolution will recognize the primacy of the health and safety of the satellite and the imaging and sounding missions.

3.6.1.2 Cross-support for Satellite Operations (S-Band)

EUMETSAT shall provide commanding access and housekeeping telemetry acquisition to / from the NOAA N and N' satellites for those orbits which are not visible from the CDA stations, located in Fairbanks and Wallops, and on request for specific operations (e.g. launch and early orbits, commissioning phase, contingency...).

NOAA shall provide commanding access and housekeeping telemetry acquisition to / from the EUMETSAT METOP-1 and METOP-2 satellites for those orbits which are not visible from the EUMETSAT Polar Command and Data Acquisition Station (PCDAS), located in Northern Europe and on request for specific operations (e.g. launch and early orbits, commissioning phase, contingency...).

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For this cross-support the ground segments shall operate in a throughput mode (bent-pipe), i.e. without processing of the commands or the telemetry other than that related to the Ground-to-Ground transmission. Housekeeping telemetry shall be provided in real time.

The NOAA Ground Segment shall be sized to provide blind orbit cross-support to one operational EUMETSAT satellite.

The EUMETSAT Ground Segment shall be sized to provide blind orbit cross-support to one operational NOAA satellite.

NOAA and EUMETSAT will make all reasonable efforts to accommodate additional requests for cross-support within the sizing of their respective ground systems.

3.6.1.3 Housekeeping Data Archive and Exchange

NOAA and EUMETSAT shall archive all Housekeeping Data received from their respective satellite.



NOAA shall make available to EUMETSAT, on an agreed upon basis, the Housekeeping Data of MHS received from the NOAA satellites

EUMETSAT shall make available to NOAA, on an agreed upon basis, the Housekeeping Data of the NOAA provided instruments (refer to section 5.1.1.1) received from the METOP satellites.

3.6.2 Ground Segment Operations

Each party shall control and operate its own Ground Segment.

NOAA and EUMETSAT shall undertake all necessary coordinations to ensure the day-to-day operation of their respective satellites and ground segment including the cross-support and blind orbit support tasks identified in section 3.6.1.2 and 3.6.3.

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3.6.3 Data Acquisition and Data Exchange

NOAA and EUMETSAT shall make available to each other the data collected by the IJPS (i.e., including the additional payloads), as established in Article 8 of the IJPS Agreement.

The provision of global data shall be made under the following conditions:

- NOAA and EUMETSAT shall make available to each other all global data collected from their respective operational satellite for those orbits which are visible from their respective data acquisition stations: PCDA in Northern Europe for EUMETSAT, CDA stations in Fairbanks and Wallops for NOAA.
- NOAA shall acquire global data from the METOP-1 satellite, and then from the METOP-2 satellite, for those orbits that are not visible from the EUMETSAT PCDA site, and shall make them available to EUMETSAT.
- EUMETSAT shall acquire global data from the NOAA-N satellite, and then from the NOAA-N' satellite, for those orbits that are not visible from the NOAA CDA stations, and shall make them available to NOAA.
- The recorded data from the NOAA N and N' satellite shall be made available at raw data level, i.e., the data shall be as received from the satellite.
- The global data from the METOP-1 and METOP-2 satellites shall be made available under the form of Virtual Channel Data Units (VCDU), decoded, and with the corresponding quality flags appended.
- The data shall be made available to the other Party in a timely fashion to ensure the processing of the data from orbit N before starting the acquisition of orbit N+1.



NOAA and EUMETSAT shall make available to each other all the data necessary to pre-process the instruments data: e.g. satellite ephemeris or orbital state, on-board time correlation, instruments calibration parameters.

The detailed requirements and definition of the interface linked to these functions is contained in [CBD 23].

The NOAA Ground Segment shall be sized to provide blind orbit data acquisition to one operational EUMETSAT satellite; additional requests will be accommodated within that sizing.

The EUMETSAT Ground Segment shall be sized to provide blind orbit data acquisition to one operational NOAA satellite; additional requests will be accommodated within that sizing.



The data acquisition stations shall ensure a rolling archive of 7 days of the satellite data acquired at the station.

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3.6.4 Data Processing and Data Distribution

The NOAA and the EUMETSAT Ground Segments shall provide the following functions:

- data ingestion and pre-processing for the recorded data from both the "mid-morning" and the "afternoon" satellites (i.e. sorting of the data, earth location and appending or application of the calibration coefficients, and performance of the associated quality control)
- distribution to the respective user communities of the pre-processed recorded data from both the morning and the afternoon satellites
- generation of derived products, as requested by the respective user community, from the recorded data of both the morning and the afternoon satellites
- distribution of the derived products, to the respective user communities;
- monitoring of the performance of the instruments, embarked on their respective spacecraft, and of the data and product generation processes by the respective Ground Segment
- maintenance of instrument calibration databases
- archiving of all global data and associated data bases, from both the mid-morning and afternoon satellites, plus all the products generated by the respective ground segments

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4 RESPONSIBILITIES AND TASKS OF THE PARTIES

The stated and implied joint and individual responsibilities of each Party, as stated in the IJPS Agreement, are cited below.

4.1 NOAA Responsibilities

NOAA responsibilities for spacecraft, instruments and ground system are delineated in Article 4 of the IJPS Agreement and relevant exchanged letters.

4.2 EUMETSAT Responsibilities

EUMETSAT responsibilities for spacecraft, instruments and ground system are delineated in Article 5 of the IJPS Agreement and relevant exchanged letters.

4.3 Joint Responsibilities



The following set of joint responsibilities are required to implement the objectives of the IJPS Agreement:

- The development of the NOAA and the EUMETSAT elements of the IJPS shall be conducted as closely coordinated but independent programs. Coordination and visibility are required and will be implemented to ensure:
 - the technical coherence of the IJPS (coherence of the key performance parameters, proper implementation of the interfaces);
 - the programmatic coherence of the development and of the deployment of the IJPS (visibility of schedules, coordination of actual launch dates).
- Each Party shall bear the costs of fulfilling its respective responsibilities. There shall be no exchange of funds between NOAA and EUMETSAT.
- NOAA and EUMETSAT shall jointly establish and maintain the necessary documents associated with the interfaces between the NOAA and EUMETSAT activities.

4.4 NOAA Tasks related to the EUMETSAT provided instruments

NOAA shall:

- Integrate and test the EUMETSAT instruments on the NOAA-N and NOAA-N' spacecraft. The definition of the activities and tests performed at the spacecraft contractor facility is included in the Unique Instrument Interface Specification.
- Monitor the health and safety of EUMETSAT instruments on the NOAA satellites.

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4.5 EUMETSAT Tasks Related to the NOAA Provided Instruments



EUMETSAT shall:

- Integrate and test the NOAA provided instruments on the METOP Engineering Model, METOP-1 and METOP-2 spacecraft. The definition of the activities and tests performed at the spacecraft contractor plant is included in the METOP Instrument ICDs.
- Monitor the health and safety of NOAA-provided instruments on the METOP satellites.

4.6 Joint Engineering Tasks

NOAA and EUMETSAT shall jointly:

- Define and maintain the key performance parameters of the IJPS;
- Perform the engineering tasks related to the accommodation of the NOAA provided instruments on the METOP Engineering Model, METOP-1 and 2 spacecraft and, in particular, establish and maintain the corresponding Interface Control Documents;
- Perform the engineering tasks related to the accommodation of the MHS instrument on the NOAA-N and N' spacecraft and, in particular, establish and maintain the corresponding Unique Instrument Interface Specification;
- Establish and maintain a configuration control process as per section 7.7.
- Collaborate, as appropriate, on development of their respective ground segments;
- Perform the engineering tasks related to the NOAA-N and NOAA-N' and the METOP-1 and METOP-2 Space to Ground interface; this shall, in particular, include participation in reviews;
- Develop and approve the Ground-to-Ground Interface Control Document;
- Develop and approve the Joint Operations, Rules, and Procedures Document (JORP);
- Perform the engineering tasks related to the Ground-to-Ground interface; this shall, in particular, include participation in reviews;
- Be responsible for developing and implementing a procurement strategy for the communication resources required for the NOAA / EUMETSAT Ground-to-Ground interface, following, jointly agreed, rules.
- Perform the tasks related to the preparation for operations and coordination of their respective Ground Segment; these include the definition, provision and use of equipment to verify telemetry and command compatibility at spacecraft level and at an end-to-end operational level;
- Establish and maintain a scientific cooperation for the development of software to utilize the IJPS data, as appropriate
- Coordinate the implementation of the (upgraded) HRPT and LRPT direct broadcast links.
- Develop a work plan to implement data denial as prescribed by the IJPS Agreement.
- Coordinate on major configuration changes of on-orbit assets;

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5 DELIVERABLES, TASKS AND SERVICES ASSOCIATED WITH THE SPACE SEGMENT

The complete list of deliverables is given in appendix D and E.

5.1 Deliverables from NOAA to EUMETSAT

5.1.1 Hardware

5.1.1.1 Instruments

NOAA shall provide to EUMETSAT the following instrument models for flight on METOP-1, METOP-2, and for use on the METOP-Engineering Model spacecraft;

- 3 (three) flight standard copies of AVHRR/3
- 3 (three) flight standard copies of AMSU-A1
- 3 (three) flight standard copies of AMSU-A2
- 2 (two) flight standard copies of HIRS/4
- 2 (two) flight standard copies of SARR
- 3 (three) flight standard copies of SARP-3
- 3 (three) flight standard copies of SEM/2



The provided instruments will be developed according to the requirement specifications identified in section 3.2.1.

The delivery site is one of the METOP Spacecraft integration sites in Europe.

The delivery dates are identified in [CBD 2].

It is agreed that, in principle, the instruments provided by NOAA will be the same as those procured for the NOAA-K, L, M spacecraft; changes are, however, not excluded. Any such change will be limited to spacecraft to instrument interface changes arising from major accommodation issues/ problems. To achieve flexibility during assembly, integration and test (AIT), it is aimed to maintain interchangeability between the instruments to be flown on NOAA-N and N' and those to be flown on METOP-1 and METOP-2.

It is recognized that the NOAA provided instruments are being built to existing designs and to given environmental levels. All reasonable efforts will be spent in the METOP design to accommodate these known levels. Any discrepancies will be negotiated. Providing the expected and tested environmental levels for the test remains the responsibility of the spacecraft provider.

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Following the satisfactory performance of the post-transport (incoming) functional test at the METOP Spacecraft integration site and the acceptance of the Pre-shipment data package by the Party responsible for the spacecraft, the instrument will be handed over to the spacecraft integrator for subsequent AIT tasks at spacecraft level.

NOAA shall ensure the availability of spare flight units for each of these instruments as follows. One of each of the instrument types provided to EUMETSAT by NOAA is to be used on METOP Engineering Model Spacecraft and shall also be considered a flight qualified spare to support both the NOAA and METOP programs. Should a situation develop which threatens the continuity of service in the mid-morning or afternoon orbit, the Parties may consider it to be in the best interest of the IJPS to ship the flight spare unit to, respectively, the EUMETSAT spacecraft contractor or the NOAA spacecraft contractor (on such occasions, due consideration will be given, inter alia, to the satellite which is closer to launch). NOAA will undertake the trouble-shooting, repair and re-calibration of instruments, if required, after delivery, under modalities to be agreed.

With respect to METOP Engineering Model Spacecraft, when deemed appropriate and subject to their availability, engineering model instruments may be used in lieu of flight models.



Components / other alerts (e.g., Government Industry Data Exchange Program) will be monitored by NOAA for its respective deliverables and will be advised to the other party when applicable to the delivered hardware. Corrective action will be carried out under modalities to be agreed, and under the responsibility of the supplier.

5.1.1.2 Ground Support Equipments

NOAA shall provide to EUMETSAT, for each of the instrument types identified in the previous section, a set of Ground Support Equipment. This set shall be specified in each of the METOP Instrument Interface Control Documents.

The delivery dates are identified in [CBD 2].

The delivery site for these items is one of the METOP spacecraft integration sites in Europe.

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5.1.2 Documentation

5.1.2.1 NOAA Provided Instruments

NOAA shall provide to EUMETSAT, for each of the instruments identified in section 5.1.1.1 the documentation necessary to integrate those instruments on the METOP spacecraft, to verify their proper functioning and to process their data. It is expected that such documentation will encompass, but not necessarily be limited to, the items hereunder. The precise identification of the documents is given in Appendix D-1. This information will, in principle, be supplied via existing documents from the development contracts. Exchange of documentation will follow the rules of article 7 of the IJPS Agreement, in particular, concerning proprietary information.

a) Instrument Requirements



- Instruments Technical / Performance Requirements;
- Instruments Performance Assurance Requirements.

b) Instruments Review Data Packages

- Data Packages for major reviews as defined in section 7.4.

c) AIT / AIV activities

- Instruments Environmental Design and Test Plan; this shall identify the tests the instrument will be subject to at instrument level; the Qualification (when applicable) and acceptance test procedures will be sent for review at least four weeks prior to the tests.
- Instrument Data and Calibration / characterization Log Books; it shall contain (in a single or separate files) the actual measured characteristics of each unit: internal alignments, Field Of View (FOV), antenna radiation patterns, bandpass characteristics, mass properties, calibration of scientific and housekeeping telemetry, scientific characterization.
- Qualification (when applicable) and Acceptance Test Results including environmental test results (part of the pre-shipment data package).
- Instruments Spacecraft Level Operation and Maintenance Manual; under the form of a consolidated file this shall include, in particular:

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- Instrument handling and safety requirements
- any instrument special requirements (e.g. purging)
- instrument functional operating procedure
- procedures for:
 - pre-installation bench checkout;
 - instrument calibration (thermal vacuum or ambient conditions, as appropriate);
- bench checkout test equipment operation and maintenance;
- thermal vacuum target operation and maintenance;
- test data reduction and correlation requirements.

- Instrument In-orbit Calibration / Characterization procedures.

d) Product Assurance

- Declared Materials / Processes and components lists;
- FMECA of the interface equipments;
- Contamination and Cleanliness Control documentation;
- EEE Reliability documents for the interface circuits.



e) Configuration Control

- Change Requests, requests for waivers, requests for deviations (as per section 7.7).
- Configuration Baseline Document Status Listing, defining the baseline design / standard of the deliverable hardware, and the basis against which changes, discrepancies and waivers may be raised; document to be jointly agreed with EUMETSAT.

f) Technical Notes, Various inputs

Under the form of ad hoc technical notes and minutes of technical interface meetings, information will be provided covering in particular the following topics:



- Inputs to the METOP Instrument ICDs; this shall cover, in particular:

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- outline / mechanical interface control drawings (including fields of view);
- instrument mass, center of gravity, moments of inertia;
- thermal control drawings;
- drill template drawings;
- instrument test fixture drawings;
- instrument disturbance and torque characteristics;
- alignment requirements;
- electrical interface drawings (up to the first active elements) and including grounding diagrams;
- connector and pin allocations;
- current and power profiles;
- EMC / EMI requirements;
- command and control interface (commands and telemetry formats, requirements toward the spacecraft Data Management System);
- GSE related requirements;
- test at the spacecraft integration site;
- launch vehicle induced mechanical environment.

These inputs shall be generated as required for spacecraft interface meetings, and shall be reviewed at the major reviews.

- Inputs to Spacecraft Flight Operations Manual, providing:
 - a description of the functionality of the instrument;
 - switch-on and commissioning procedures;
 - operating constraints;
 - nominal operations;
 - contingency.
- Inputs to the Spacecraft GSE processing requirements: to allow the Spacecraft GSE contractor to establish the Software Requirement Document for the processing and handling of the instruments when tested at spacecraft level.
- Inputs for the Launcher Safety File.

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5.1.2.2 MHS

NOAA shall provide to EUMETSAT for the MHS the following documents:



- Unique Instrument Interface Specification; aiming to define all the interface items between the spacecraft and the instrument, it will cover, in particular:
 - electrical interface;
 - mechanical interface;
 - thermal interface;
 - environmental interface (magnetic, EMI, flight environment);
 - operational requirements and precautions (in-flight and on-ground);
 - test equipment and services (to be provided by the instruments and the spacecraft side);
 - definition of the tests performed at the satellite integration site.
- EGSE Processing Software Description; it will describe the software implemented for MHS testing within the Advanced TIROS Aerospace Ground Equipment;
- MHS Spacecraft level test procedures (for review, to be sent at least four weeks before the tests);
- MHS spacecraft level test results;
- Data packages related to MHS interfaces for major spacecraft or sub-system reviews;
- On-orbit verification test plan.

5.1.3 Software Models

NOAA shall provide to EUMETSAT, for each of the instruments identified in section 5.1.1.1 a set of software with its associated documentation. This set shall be specified in each of the METOP Instrument Interface Control Documents. It is expected that it will encompass but not necessarily be limited to, the items hereunder.

a) Reduced Finite Element Model

- in NASTRAN (a NASTRAN finite element model representation of the instrument having the fewest number of gridpoints that will accurately define the instrument dynamic characteristics).

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b) Reduced surface model

- in ESARAD

c) Reduced Thermal Model

- in ESATAN

Plus associated documentation

5.2 Tasks and Services provided by NOAA to EUMETSAT



The following services will be provided by NOAA either directly or through delegation to the NASA / GSFC POES Program (see section 7.3.1).

5.2.1 Pre-launch Engineering Tasks

NOAA shall provide the following support to the METOP Engineering Model and the METOP-1 and 2 pre-launch activities, related to the NOAA provided instruments:

a) Planned Support

- Support to definition of instrument to spacecraft EGSE interface, including science data interpretation (i.e. calibration) and test procedure design;
- Performance of post-transport (incoming) instrument functional test at the METOP spacecraft integration site;
- Support to mechanical and electrical integration;
- Support to electrical performance tests at spacecraft level;
- Support to environmental test at spacecraft level;
- Support to the launch campaign;
- Support to the preparation for launch and operations;
- Maintenance of the provided GSE, including software;
- Support to pre-launch calibration activities;
- Support the definition, provision and use of equipment to verify telemetry and command compatibility at spacecraft level and at end-to-end operational level.
- Support for compatibility of NOAA instruments on the METOP spacecraft.

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b) Ad-Hoc Support

- Trouble shooting on instruments;
- Repair of delivered hardware after failure;
- Debugging of the instrument related elements of the spacecraft EGSE.

NOAA will provided on-site support, as agreed, for the above tasks.

5.2.2 Post-Launch Engineering Tasks

EUMETSAT is responsible for the post-launch checkout, commissioning and operations of the METOP-1 and 2 satellites. NOAA shall provide the following support to the METOP-1 and 2 post-launch activities, related to the NOAA provided instruments:

a) Planned Support

- In-orbit commissioning; evolution of flight operations procedures; performance evaluation; calibration and characterization;
- Support to the LEOP and commissioning phase,
- Support the routine in-orbit performance assessment of the instruments,
- Support to the regular performance reviews.

b) Ad-Hoc Support

- Support to the investigation and response to in-orbit anomalies and emergency situations.

5.3 Deliverables from EUMETSAT to NOAA

5.3.1 Hardware



5.3.1.1 Instruments

EUMETSAT shall provide to NOAA the following instrument models:

- 2 (two) copies of MHS for flight on NOAA-N and N'.

The provided instruments will be developed according to the requirement specifications identified in [RDE 20], MHS Performance Specification.

The delivery site is the NOAA Spacecraft integration site.

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The delivery dates are identified in [CBD 2].

EUMETSAT shall ensure the availability of a spare MHS flight unit as follows: A single flight spare unit shall be used to support the NOAA and METOP programs. Should a situation develop which threatens the continuity of service in the mid-morning or afternoon orbit, the Parties may consider it to be in the best interest of the IJPS to ship the flight spare unit to, respectively, the EUMETSAT spacecraft contractor or the NOAA spacecraft contractor (on such occasions, due consideration will be given, inter alia, to the satellite which is closer to launch.)

Testing to the specified environmental levels for acceptance of flight units and ensuring the proper qualification of instruments remains the responsibility of the instrument supplier.

Following the satisfactory performance of the post-transport (incoming) functional test at the NOAA Spacecraft integration site and the acceptance of the Pre-shipment data package by the Party responsible for the spacecraft, the instrument will be handed over to the spacecraft integrator for subsequent AIT tasks at spacecraft level.

EUMETSAT will undertake the trouble-shooting, repair and re-calibration of instruments, if required, after delivery, under modalities to be agreed.



Components / other alerts (e.g. Government Industry Data Exchange Program) will be monitored by EUMETSAT for its respective deliverables and will be advised to the other party when applicable to the delivered hardware. Corrective action will be carried out under modalities to be agreed, and under the responsibility of the supplier.

5.3.1.2 Ground Support Equipments

EUMETSAT shall provide to NOAA, for the MHS, a set of Ground Support Equipment. This set shall be specified in the Unique Instrument Interface Specification.

The delivery dates are identified in [CBD 2].

The delivery site for these items is the NOAA Spacecraft Contractor facility.

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5.3.2 Documentation

5.3.2.1 MHS

EUMETSAT shall provide NOAA, for the MHS the documentation necessary to integrate it on the NOAA spacecraft, to verify its proper functioning and to process its data. It is expected that such documentation will encompass, but not necessarily be limited to, the items hereunder. The precise identification of the documents is given in Appendix D-2. This information will, in principle, be supplied via existing documents from the development contract. Exchange of documentation will follow the rules of article 7 of the IJPS Agreement, in particular, concerning proprietary information.

a) Instrument Requirements



- Instrument Performance and Functional Specification;
- Instrument Product Assurance Requirements.

b) Instrument Review Data Packages

- Data package for instrument major review as defined in section 7.4.

c) AIT / AIV activities

- Instrument AIT Plan; this shall identify the tests the instrument will be subject to at instrument level; the qualification and acceptance test procedures will be sent for review at least four weeks prior to the tests.
- Instrument Data and Calibration / Characterization Log Books; it shall contain (in a single or separate files) the actual measured characteristics, mass properties, calibration of scientific and housekeeping telemetry, scientific characterizations, FOV, antenna pattern, bandpass characteristics and internal alignment, ...
- Qualification and acceptance Test Results including environmental test results (part of the Flight Acceptance Review data package).
- Instrument Spacecraft Level Operation and Maintenance Manual; under the form of a consolidated file this shall include, in particular:
 - Instrument handling and safety requirements;
 - any instrument special requirements (e.g. purging);
 - instrument functional operating procedure;

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- procedures for:
 - pre-installation bench checkout;
 - instrument calibration (thermal vacuum or ambient conditions, as appropriate);
- bench checkout test equipment operation and maintenance;
- thermal vacuum target operation and maintenance;
- test data reduction and correlation requirements.

- Instrument In-orbit Calibration / Characterization procedures.

d) Product Assurance

- Declared Materials / Processes and components lists;
- FMECA of the interface equipments;
- Contamination and Cleanliness Control documentation;
- EEE Reliability documents for the interface circuits.



e) Configuration Control

- Change Requests, requests for waivers, requests for deviations (as per section 7.7).
- Baseline Configuration Status Listing, defining the baseline design / standard of the deliverable hardware, and the basis against which changes, discrepancies and waivers may be raised; document to be jointly agreed with NOAA.

f) Technical Notes, Various Inputs

Under the form of ad hoc technical notes and minutes of technical interface meetings, information will be provided covering in particular the following topics:

- Inputs to the UIIS; this shall cover, in particular:
 - outline / mechanical interface control drawings (including fields of view);
 - instrument mass, center of gravity, moments of inertia;
 - thermal control drawings;
 - drill template drawings;
 - instrument test fixture drawings;
 - instrument disturbance and torque characteristics;
 - alignment requirements;
 - electrical interface drawings (up to the first active elements) and including grounding diagrams;

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- connector and pin allocations;
- current and power profiles;
- EMC / EMI requirements;
- command and control interface (commands and telemetry formats, requirements toward the spacecraft Data Management System);
- GSE related requirements;
- test at the spacecraft integration site;
- launch vehicle induced mechanical environment.



These inputs shall be generated as required for spacecraft interface meetings, and shall be reviewed at the major reviews.

- Inputs to Spacecraft Flight Operations Manual, providing:
 - a description of the functionality of the instrument;
 - switch-on and commissioning procedures;
 - operating constraints;
 - nominal operations;
 - contingency.
- Inputs to the Spacecraft GSE processing requirements: to allow the Spacecraft GSE contractor to establish the Software Requirement Document for the processing and handling of the instruments when tested at spacecraft level.
- Inputs for the Launcher Safety File.

5.3.2.2 NOAA Provided Instruments

EUMETSAT shall provide to NOAA for each of the instruments listed in section 5.1.1.1 the following documentation:

- METOP Instrument Interface Control Documents (ICDs); aiming to define all specific features of the interface between the spacecraft and each individual instrument, covering, in particular:
 - electrical interface;
 - mechanical interface;
 - thermal interface;
 - EMC / RFC interface;
 - cleanliness and space environment design constraints;

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- instrument design verification;
- ground support equipment;
- ground operation; flight operation;
- product assurance and reliability.

- EGSE Processing Software Description; it will define the software implemented for the testing of the NOAA provided instruments within the METOP EGSE;
- Spacecraft Level AIT Plan, as related to the NOAA instruments;
- Spacecraft level test procedures, as related to the NOAA instruments, (for review, to be sent at least four weeks before the tests);
- Spacecraft level test results, as related to the NOAA instruments;
- Major METOP System Reviews presentation data packages;
- Major METOP System Reviews technical data package dedicated to NOAA instruments;
- In-orbit test and operation plans and procedures.

5.3.3 Software Models

EUMETSAT shall provide to NOAA for the MHS a set of software models with their associated documentation. This set shall be specified in the Unique Instrument Interface Specification document. It is expected that it will encompass but not necessarily be limited to the items hereunder.

a) Finite Element Model

- A NASTRAN finite element model representation of the instrument having the fewest number of gridpoints that will accurately define the instrument dynamic characteristics.

b) Reduced Surface Model



- In TRASYS standard (in tabular form)

c) Reduced Thermal Model

- In SINDA standard

5.4 Tasks and Services provided by EUMETSAT to NOAA

The following tasks and services will be provided by EUMETSAT either directly or jointly with ESA (see section 7.3.2).

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5.4.1 Prelaunch Engineering Tasks

EUMETSAT shall provide the following support to the NOAA-N and NOAA-N' prelaunch activities, related to the MHS instrument:

a) Planned Support

- Support to definition of instrument to spacecraft EGSE interface, including science data interpretation (i.e. calibration) and test procedure design;
- Performance of post-transport (incoming) instrument functional test at the NOAA spacecraft integration site;
- Support to mechanical and electrical integration;
- Support to electrical performance tests at spacecraft level;
- Support to environmental test at spacecraft level;
- Support to the launch campaign;
- Support to the preparation for launch and operations;
- Maintenance of the provided GSE, including software;
- Support to pre-launch calibration activities
- Support the definition, provision and use of equipment to verify telemetry and command compatibility at spacecraft level and at end-to-end operational level.
- Support for compatibility of MHS on the NOAA spacecraft.



b) Ad-Hoc Support

- Trouble shooting on instruments;
- Repair of delivered hardware after failure;
- Debugging of the instrument related elements of the ATNAGE.

EUMETSAT will provided on-site support, as agreed, for the above tasks.

5.4.2 Post-Launch Engineering Tasks

NOAA is responsible for the post-launch checkout, commissioning and operations of the NOAA-N and N' satellites. EUMETSAT shall provide the following support to the NOAA-N and NOAA-N' post launch activities, related to the MHS instruments:



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a) Planned Support

- In-orbit commissioning of instruments; evolution of flight operations procedures; performance evaluation; calibration and characterisation;
- Support to the LEOP and commissioning phase,
- Support the routine in-orbit performance assessment of the instruments,
- Support to the regular performance reviews.

b) Ad-Hoc Support

- Support to the investigation and response to in-orbit anomalies and emergency situations.

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6 DELIVERABLES, TASKS AND SERVICES ASSOCIATED WITH THE GROUND SEGMENTS

NOAA and EUMETSAT will exchange deliverables and perform tasks and services for the design, the development, the testing, the validation and the operations preparation of their respective Ground Segments as described in section 3.6.

The delivery dates, for key deliverables described below, are given in [CBD 2].

This shall cover in particular:

- Space to Ground and Ground to Ground interface engineering;
- Product generation specifications and formats.



NOAA has produced the Satellite to Ground Interface for NOAA-K, L, M, which is applicable for the NOAA-N, N' to Ground ICD; EUMETSAT shall be responsible for producing the METOP-1, -2 to Ground ICD. EUMETSAT will be responsible for initiating the Ground to Ground IRD and NOAA will be responsible for initiating the Joint Operations, Rules, and Procedures (JORP) Document. In addition both parties will be responsible for establishing the first issue of the Ground to Ground ICD(s).

Collaboration between the two Parties shall be maintained to utilize the IJPS data through the exchange of documentation pertaining to data processing.

6.1 Deliverables from NOAA to EUMETSAT

NOAA shall:

- Provide to EUMETSAT all information concerning the NOAA Space to Ground Links necessary for EUMETSAT to design a ground segment capable of ensuring the tasks outlined in section 3.6;
- Provide to EUMETSAT all information concerning the Ground to Ground interface necessary for EUMETSAT to design a ground segment capable of ensuring the data exchange and the operation coordination outlined in section 3.6 and established Ground to Ground Interface Documents;
- Provide to EUMETSAT data packages for major Ground Segment reviews as outlined in section 7.4.
- Provide to EUMETSAT all necessary information for the understanding of pre-processing and product processing, for each NOAA provided instrument, to include

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- science specifications, system descriptions, architectural design and interface documents as well as user and maintenance manuals;
- Provide to EUMETSAT any NOAA unique command and / or data acquisition equipment required to perform the data acquisition, the housekeeping telemetry acquisition, the commanding access and data handling from / to the NOAA satellite; the identification of such equipment will be jointly agreed;
- Provide to EUMETSAT housekeeping telemetry acquisition and commanding access from / to the METOP satellite as per section 3.6;
- Provide to EUMETSAT in a timely fashion:
 - all information (i.e. operational requests, orbit state vector, on-board time correlation...) necessary to perform the operational planning and actual operations of the respective Ground Segments and Satellites;
 - all instrument information (i.e. pre-processing changes, calibration parameters updates, etc...) necessary to sustain operational data / products generation.

6.2 Tasks and Services provided by NOAA to EUMETSAT



NOAA shall:

- Provide support to EUMETSAT for the test and the validation of the EUMETSAT Ground Segment for all interface functions with NOAA;
- Provide to EUMETSAT all necessary training for operating and maintaining NOAA-provided unique command and / or data acquisition equipment
- Provide to EUMETSAT ground segment support associated with the on-orbit tasks described in section 5.2.2;

6.3 Deliverables from EUMETSAT to NOAA

EUMETSAT shall:

- Provide to NOAA all information concerning the METOP Space to Ground Links necessary for NOAA to design a ground segment capable of ensuring the tasks outlined in section 3.6;
- Provide to NOAA all information concerning the Ground to Ground interface necessary for NOAA to design a ground segment capable of ensuring the data exchange and the operation coordination outlined in section 3.6 and established Ground to Ground Interface Documents;
- Provide to NOAA data packages for major Ground Segment reviews as outlined in section 7.4.
- Provide to NOAA all necessary information for the understanding of pre-processing and product processing, for each EUMETSAT provided instrument, to include science



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- specifications, system descriptions, architectural design and interface documents as well as user and maintenance manuals;
- Provide to NOAA any EUMETSAT unique command and / or data acquisition equipment required to perform the data acquisition, the housekeeping telemetry acquisition, the commanding access and data handling from / to the METOP satellite; the identification of such equipment will be jointly agreed;
- Provide to NOAA housekeeping telemetry acquisition and commanding access from / to the NOAA satellite as per section 3.6;
- Provide to NOAA in a timely fashion:
 - all information (i.e. operational requests, orbit state vector, on-board time correlation...) necessary to perform the operational planning and actual operations of the respective Ground Segments and Satellites;
 - all instrument information (i.e. pre-processing changes, calibration parameters updates, etc...) necessary to sustain operational / products generation.

6.4 Tasks and Services provided by EUMETSAT to NOAA

EUMETSAT shall:

- Provide support to NOAA for the test and the validation of the NOAA Ground Segment for all interface functions with EUMETSAT;
- Provide to NOAA all necessary training for operating and maintaining EUMETSAT-provided unique command and / or data acquisition equipment
- Provide to NOAA ground segment support associated with the on-orbit tasks described in section 5.4.2;

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7 PROGRAM MANAGEMENT

7.1 General

As a general rule, the extent of involvement of one party in the other party's activities is determined by the necessity of either party to have sufficient visibility of the other party's activities to enable:

- the fulfillment of its responsibility within its own program
- to coordinate their activities
- to mutually resolve non-compliances in the interest of the end user

The cooperation between the two parties will be based primarily on exchange of information, documentation, and regular meetings.

The EUMETSAT and NOAA Program Managers shall consult with each other should doubts arise concerning the feasibility of any item within their responsibility related to the interface between the parties.



Both parties will invite the other party to meetings, including those with third parties, which have a bearing on the fulfillment of that party's responsibility within their respective programs.

7.2 Points of contact

The official contact points for the purpose of the coordination between NOAA and EUMETSAT on IJPS are:

For NOAA

Michael Mignogno
POES Program Manager
E/OSD, RM 3301, FB-4
NOAA NESDIS
5200 Auth RD
Suitland, Maryland 20746-4304
USA

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For EUMETSAT:

Marc Cohen
EPS Programme Manager
EUMETSAT
Postfach 10 05 55
D-64205 Darmstadt
Germany

The Parties will identify the names of the designated Project Managers, exchange the organization charts and provide updates as appropriate [RDN 3, RDE 6].

7.3 NOAA and EUMETSAT management structures



NOAA and EUMETSAT will each establish a program management structure with clear definition of responsibilities, authority and reporting lines. Each Organization will be responsible for setting up a team, for the allocation of responsibilities, and for nomination of points of contact in the relevant areas of responsibility (technical, programmatic) for interfacing the program and project teams, external contractors, and cooperating agencies.

7.3.1 NOAA Management Structure

The signatory of the IJPS Agreement is the NOAA Administrator. Within NOAA, NOAA / NESDIS has the overall mission and program management authority and provides final determination over changes in scope of the System. NOAA/NESDIS liaises with CNES for provision of SARP and with DND of Canada for provision of SARR instruments designated for METOP. NOAA/NESDIS develops and implements changes in the ground system in accordance with ground segment interface agreements between EUMETSAT, operates the NOAA satellites, and produces products from the IJPS data. Program Authority for POES is the POES Program Manager in NESDIS.

NOAA/SAO provides acquisition management oversight of the NOAA instruments to be incorporated on the METOP satellite. These instruments are the AVHRR, HIRS/4, AMSU-A, SEM/2, and Search and Rescue suite. NOAA/SAO executes the instrument acquisition within the Program Management framework established by the NESDIS Program Manager. NOAA/SAO provides NOAA oversight of NASA acquisition activities.

On behalf of NOAA, the National Aeronautics and Space Administration, Goddard Space Flight Center (NASA/GSFC) has the overall systems responsibility for the management, procurement, integration and testing of the NOAA provided instruments and the related GSE.

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The NASA /GSFC POES Project Office, in its role as system development manager, has been designated by NOAA as the responsible organization with authority to oversee all instrument interface requirements with the METOP spacecraft.

7.3.2 EUMETSAT Management Structure



The signatory of the IJPS Agreement is the EUMETSAT Director. Within EUMETSAT, the Low Earth Orbit (LEO) Division of the Technical Department has the overall mission, system and programme authority and provides final determination over changes in scope of the System. The EPS Programme Manager, also Head of the LEO Division, has overall responsibility for the implementation of the EUMETSAT EPS Programme, which includes the EUMETSAT contributions to the IJPS System and all IJPS-relevant interfaces. This responsibility covers in particular the definition of EPS mission and system requirements, the development and procurement of the MHS instruments and of the EPS Overall Ground Segment, the provision of the IASI and ARGOS DCS instruments, the procurement of the launch services, and overall system activities including integration, verification, validation and hand over to the EUMETSAT Operations Division, which will operate the METOP satellites within the EPS system. Other EUMETSAT technical and administrative entities support the EPS Programme Manager in the implementation of the EPS Programme.

EUMETSAT has a separate Agreement with ESA for the establishment of the space segment to meet the EPS mission and system requirements. The development and procurement activities under this separate Agreement are performed by a Single Space Segment Team (SSST) composed of staff from EUMETSAT and ESA and located at ESA-ESTEC. The SSST has the responsibility for the management, procurement, integration and testing of the METOP spacecraft, GOME-2, GRAS and ASCAT instruments and related GSE. It also oversees all METOP satellite/instrument interfaces and METOP external interfaces.

EUMETSAT has also two separate Agreements with CNES for the provision of the Infrared Atmospheric Sounding Interferometer (IASI) and ARGOS Data Collection System instruments to be flown on the METOP-1 and METOP-2 spacecraft.

7.3.3 Lines of Communications

For all program level issues, the formal approval / communication path from or to NASA or SSST is through NOAA or EUMETSAT respectively. Should technical issues associated with the accommodation of the NOAA provided instruments on METOP-1 and METOP-2 arise, NASA and SSST may resolve these problems directly with recommended disposition provided to NOAA and EUMETSAT. In a similar fashion, should technical issues associated with the

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accommodation of the MHS on NOAA-N and N' arise, NASA and EUMETSAT may resolve these problems directly with disposition, information provided to NOAA.

7.3.4 Problem mitigation process

Both parties recognize the importance of receiving early information about events which might potentially affect the fulfillment of the requirements laid down in the Coordinated Baseline (section 7.6).

This is in particular the case for:

- non - conformance
- industry Engineering Change Proposal (ECP)

Each party will notify the other about such problems/changes as early as possible.

The notification shall describe the potential consequence on the Coordinated Baseline.

Should problematic or technical issues arise for which management mechanisms are not addressed by the PIP, the Programs Managers may establish ad-hoc working groups to address these issues.



7.4 Reviews

The NOAA and EUMETSAT end-to-end system design will integrate satellites, communication links, ground systems, and users. Each Party will conduct the development of its IJPS elements according to its standard practice. Formal reviews will be held at key milestones of the development.

The following reviews are identified as the minimum set of reviews to which each Party will participate and serve as a Board Member where indicated (P for participation and RB for Review Board Member). Each Party can designate a representative of its choice.

For each review the invited party will be provided with copies of the review documentation unless otherwise stated.

Each Party will be invited to other potential reviews including lower level reviews (e.g. on critical items), if found mutually beneficial.

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7.4.1 NOAA Reviews

7.4.1.1 NOAA provided instruments reviews

As the NOAA instruments for NOAA-N and N' and for METOP-1 and METOP-2 are drawn from an existing design, they are subject to a limited review cycle aimed to assess the impacts of changes from the previous instrument procurement.



- Pre-Environmental Review (PER); the objective of this review is to confirm the readiness of each instrument prior to environmental testing (P);
- Pre-Shipment Review (PSR); the objectives of this review are to confirm the (qualification) / acceptance status of each instrument unit and to authorise its shipment to the METOP Spacecraft Contractor. The instruments shall be shipped only if EUMETSAT agrees with the disposition of the issues raised at the PSR (RB);
- Instrument readiness review; the objectives of this review are to confirm acceptability of each instrument's test performance, final calibration curves, ground system status (e.g. databases, software configuration) in preparation for launch (P).

7.4.1.2 NOAA-N and N' reviews

- Pre-Environmental Test Review; the objectives of this review are to confirm the readiness status of each satellite (NOAA-N and N') prior to environmental testing (P);
- Pre-Ship Review; the objectives of this review are to confirm the (qualification) / acceptance status of each satellite (NOAA-N and N') and to authorize its shipment to the launch pad or its storage (P);
- On-orbit Performance Verification Review; the objective of this review is to confirm the on-orbit status of the spacecraft and its instruments (P).

7.4.1.3 NOAA Ground Segment reviews

- IJPS communication architecture study review (P);
- System Requirement Review (SRR); the objective of this review is to assess the system level specifications (RB);
- Preliminary Design Review (PDR); the objectives of this review are to confirm the ground segment design and correlation with requirements and to authorise the detailed design (RB);

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- Critical Design Review (CDR); the objectives of this review are to confirm the detailed design and the performances of the ground segment (RB);
- METOP Compatibility Review (MCR): The objective of this review is to assure adequate test plans, resources, and schedules exist to conduct compatibility tests between the NOAA ground system and the METOP spacecraft (P);
- System Readiness Review: the objective of this review is to establish readiness of the ground segment in preparation for operations (P).



7.4.2 EUMETSAT Reviews

7.4.2.1 EUMETSAT provided instrument reviews (MHS)

- System Concept Review (SCR); the objective of this review is to review the design of the MHS and its constituent subsystems / equipments. (P)
- Preliminary Design Review (PDR); the objectives of this review are to confirm the instrument design and to authorize the manufacturing of the Engineering Model.(RB)
- Critical Design Review (CDR); the objectives of this review are to confirm the detailed design and performance of the instrument and to authorize the Flight Model manufacture (RB);
- Test Readiness Review (TRR); the objective of this review is to confirm the readiness of each instrument flight model to commence environmental testing (P);
- Flight Acceptance Review (FAR) is held to determine the instrument's acceptability for flight. During the FAR, the decision is made to either store the instrument or ship it to the spacecraft manufacturer for integration and test. If the MHS is placed in storage, a Pre-Ship review is held to determine the flight worthiness of the instrument at the end of the storage period (RB).

7.4.2.2 METOP-1 and METOP-2 reviews

- System Requirement Review (SRR); the objective of this review is to assess the system level specifications and the phase C/D project development plans (P);
- Preliminary Design Review (PDR); the objectives of this review are to confirm the satellite design and to authorize the manufacturing of the Engineering Model (P);
- Critical Design Review (CDR); the objectives of this review are to confirm the detailed design and the performances of the satellite as demonstrated by the EM testing and to authorize the manufacturing of the Flight Model (P);



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- Qualification Results Reviews (QRR); for those satellite elements to which it is applicable, the objective of this review is to confirm their qualification status as obtained at the end of the qualification process (P);
- Flight Acceptance Review (FAR); the objectives of this review are to confirm the (qualification) / acceptance status of each satellite (METOP-1 and METOP-2) and to authorize its shipment to the launch pad or its storage (P);

7.4.2.3 EUMETSAT System and Ground Segment reviews

The reviews shall be as follows:

- a) System level review:
 - System Critical Design Review (SCDR): Review coherence and compliance of system design, system interfaces (ICDs), system margins and verification/validation plans. (RB)
 - System Validation Test Readiness Reviews (TRRs) and Test Review Boards (TRBs): Reviews to establish readiness for (TRR) and completion of (TRB) validation of the satellite to ground segment interfaces. These reviews will be co-chaired by EUMETSAT and ESA (P).
 - GS Operational System Validation Review (OSVR): Review of the validation of the operational procedures and databases (DB) (for both the satellite and the ground segment) with the aim to establish the EUMETSAT ground segment readiness to support commissioning and routine operations (RB).
 - System Readiness Review (SRR): to establish readiness of the satellite, ground segment and LEOP in preparation for launch, with the aim to authorize the start of the launch campaign (RB).
 - System Commissioning Review (SCR): Verify results of LEOP and system commissioning to ensure complete functionality and performance of the system. For METOP-1, the aim is to declare the METOP system operational. For METOP-2 the aim is to declare the satellite operational (RB).
- b) Ground Segment level Review
 - Core Ground Segment Requirements Review (CGSRR): Review and confirm the consistency and completeness of Core Ground Segment requirements (RB)
 - CGS Design Review (PDR): Review the status of the ground segment concept, facility and interface requirements with the aim to allow the start of detailed design and development activities (RB).
 - CGS Critical Design Review (CDR): Review of the detailed design of the ground segment after all facilities design reviews. (RB)

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- CGS Acceptance Test Review: Review and establish readiness of Core Ground Segment for Preparation of Operations (RB)
- c) LEOP reviews for METOP-1 and METOP-2
 - LEOP Readiness Review (LERR): Review of the validation of the operational procedures and databases (for both the satellite and the LEOP ground segment) with the aim to establish the LEOP ground segment readiness (P).

For each of the reviews listed above, NOAA will receive copies of the review documentation except for:

- the OSVR where no copy will be supplied (due to the size of the documentation),
- the CGS facilities reviews under b) where NOAA shall receive the content list of the data packages and will select the relevant documents to be supplied by EUMETSAT, if available to EUMETSAT.

7.5 Meetings

7.5.1 Meetings coordination

NOAA and EUMETSAT will invite the other party to meetings, including those with third parties, which have a bearing on the fulfillment of that party's responsibility within the respective programs.



NOAA and EUMETSAT will ensure that no restrictions are contained within their relevant contracts, and/or cooperation agreements, on NOAA's or EUMETSAT's attendance at meetings. NOAA and EUMETSAT will also ensure that attendance at such meetings by the invited party is in conformance with Article 7 of the IJPS Agreement.

The initial attendance at meetings will be proposed by the party responsible for the meeting. Additions to this attendance will be mutually agreed between the parties.

Meeting plans will be established by NOAA and EUMETSAT, regularly updated and provided to both parties.

The party responsible for the meeting will indicate an outline agenda for the meeting and the proposed participation (at least one week in advance (wherever practicable)). The other party may request additional participation as considered necessary.

Details of meetings arranged outside the frame of NOAA and EUMETSAT but having relevance shall, as far as possible, be communicated to the other party.

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Meeting minutes will be the responsibility of the party calling the meeting and shall be signed by all parties involved.

The tracking of actions relative to POES space and ground segments will be performed by NOAA.

The tracking of actions relative to EPS System will be performed by EUMETSAT.

A status list of these action items will be issued regularly, nominally on a bi-monthly basis, unless agreed otherwise.

7.5.2 Program Management Coordination Meetings

Coordination meetings shall be held at least on a semi-annual basis to ensure the coordination of the respective programs and exchange information in the following areas:



- Overall status of the various elements of the IJPS system, major design evolutions, progress and problems
- Coordination of EUMETSAT and NOAA activities; action item status, meetings plans, deliverables
- Review and update of milestones
- Status of the Coordinated Baseline; Non Compliance Reviews, Request For Waiver and Request For Deviations

These management coordination meetings shall take place alternating between NOAA and EUMETSAT sites.

7.6 Definition of the Coordinated Baseline

The Coordinated Baseline (CB) defines the programmatic, operational, and technical basis for the IJPS. It is composed of a jointly configured set of documents as specified in Appendix C. These documents are mutually agreed and configuration controlled by the parties.

These documents are supported by many organization specific and applicable documents including standards and industry-generated specifications. Whilst these shall be configured documents and shall adhere to strict change procedures they do not constitute part of the CB.

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The documents which comprise the CB for the IJPS, shall be jointly signed by the NOAA Program Manager and the EPS Programme Manager, and as appropriate, the NASA and SSST Project Managers.

The precise listing and configuration status of the CB will be contained in the CB Status List, which will be published as [RDE 7] and maintained by EUMETSAT. This document shall be available at each Management Coordination meeting.

7.7 Configuration Control

This Configuration Control process shall be used to coordinate the approval of the technical, and programmatic consequences of changes that affect the Coordinated Baseline.

The flow chart of the Configuration Control process is given below.

When a party identifies the need to change the Coordinated Baseline, they shall initiate a Change Request (CR), step <1>, using the Change Request form. A Change Request to a CB document can be initiated only by a signatory of that CB document.



This change may result from a Non-Conformance or the initiation of a new requirement. The CR shall clearly identify the part of the affected documents and define the modifications to the technical and programmatic baseline.

The CR will be distributed to all signatories of the related CB document, together with a timeline for the Configuration Control Board (CCB) venue in order to meet any schedule constraints of the initiator. EUMETSAT and NOAA will agree on a date for the related CCB.

While the parties are encouraged to solve engineering problems at working level, any decision potentially affecting the CB shall be valid only when fully documented and approved by the Program Managers or their duly appointed representatives, through this Configuration Control process.

Implementation of any such changes shall be deferred until after the disposition of the CCB

The receiving party(ies) shall analyze the change impact on the respective portion of the IJPS and respond to the issuing party (step <2>). As appropriate, NOAA and EUMETSAT will consolidate assessments from NASA and SSST respectively.

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The parties will hold the CCB (step 3), with the following agenda, including but not limited to:

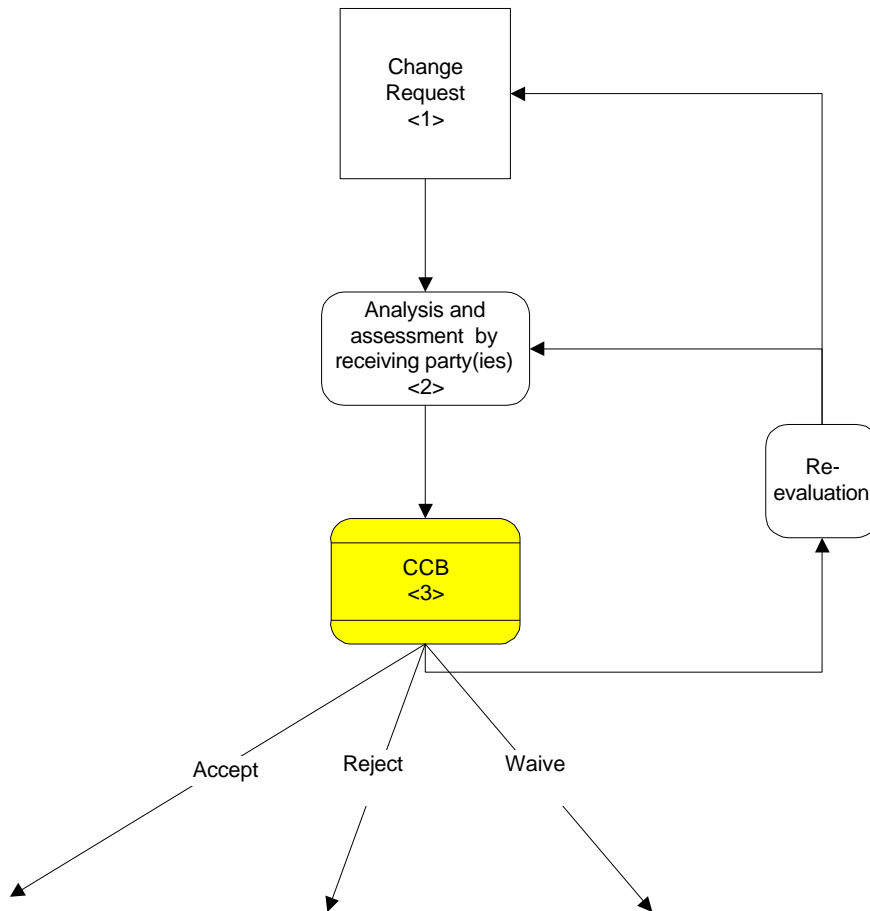
- statement of Changes Requests by the initiating party
- rationale for change request by the initiating party
- review of impacts assessments by all parties
- disposition of the Change Request

Disposition for a change request can be one of the following:



- **ACCEPT**, the change request is approved and subsequently implemented using internal procedures of each party. Each party shall bear its own cost in implementing the CCB decisions. The agreement granted shall be recorded on the front page of all affected CB documents by the dated signatures of the Program/Project Managers.
- **REJECT**, all parties agree not to implement the change
- **WAIVE**, all parties agree not to implement the change and accept the non conformance, the accepted Waiver will be entered in the CB
- **RE-EVALUATE**; the CCB asks for further analysis or amendment of the CR

The CCB is co-chaired by NOAA and EUMETSAT who will have final decision making authority. Any dispute that cannot be resolved between EUMETSAT and NOAA shall follow the settlement of dispute procedures as stipulated in the IJPS Agreement (section 1.1).

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Configuration Control process

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8 ADMINISTRATIVE

8.1 COMMUNICATIONS

Each party is responsible for the communication with the Industry/Agency/Company with which it has a contract/agreement. One party will not send any information to an entity contractually linked to the other party without prior approval from the other party.

8.2 DOCUMENTATION

8.2.1 Deliverable Referenced Documents

These documents will be configuration controlled by the developer of the documents. Consequently, these deliverable documents are not subject to the Configuration Control Process as given in section 7.7.



The Referenced Documents (RD), shown by RDN for NOAA documents and RDE for EUMETSAT documents, are listed in Appendix D.

Comments – if any – to these documents may be requested by the issuing party, or may be given by the receiving party on its own initiative. Implementation of these comments is up to the discretion of the issuing party, who shall take full responsibility of any consequences resulting from the implementation or not of these comments.

The reception of documents shall be acknowledged by the receiving party within 5 working days.



8.2.2 Media for Delivery of Information

EUMETSAT and NOAA shall provide documents listed in appendices C and D in paper format and in electronic format, if available.

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8.2.3 Dissemination of Information

Without prejudice to the rights and obligations of Article 12 of the IJPS Agreement concerning “Intellectual Property Rights”, NOAA and EUMETSAT agree to consult each other, before any information – generated in the course of or resulting from work undertaken for the purpose of the EPS Programme – is disseminated to third parties by EUMETSAT. Similarly NOAA and EUMETSAT agree to consult each other, before any information – generated in the course of or resulting from work undertaken for the purpose of the IJPS – is disseminated to third parties by NOAA.

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APPENDIX A – KEY PLANNING DATES

Launch of METOP-1: June 2003
Launch of NOAA-N: December 2003
Launch of NOAA-N': January 2008
Launch of METOP-2: February 2008



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APPENDIX B - ACRONYMS



ACN	Agreement Change Notice
AD	Associated Document
ADR	Architectural Design Review
ADCS	Advanced DCS
ALS	Ariane Launch Services
AIT	Assembly, Integration and Test
AIV	Assembly, Integration, and Verification
AMSU-A	Advanced Microwave Sounding Unit
ATNAGE	Advanced TIROS-N Aerospace Ground Equipment
AOCS	Attitude and Orbit Control Subsystem
APT	Automatic Picture Transmission
AR	Acceptance Review
ARGOS	Advanced Data Collection and Location System
ASCAT	Advanced Scatterometer
ASW	Application Software
AVHRR	Advanced Very High Resolution Radiometer
CB	Coordinated Baseline
CBSL	Coordinated Baseline Status List
CBD	Configured Baseline Document
CDR	Critical Design Review
CF	Central Facility
CCB	Change Control Board
CCN	Contract Change Notice
CDA	Command and Data Acquisition (Station)
CFI	Contractor Furnished Information
CGS	Core Ground Segment
CMO	Configuration Management Office
CN	Change Notice
CNES	Centre National d'Etudes Spatiales
CR	Change Request
CRB	Change Review Board
DB	Database
DCN	Document Change Notice
DCS	Detailed Coordination Schedule
DCS	Data Collection and Location System

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DHSS	Data Handling Subsystem
DRB	Delivery Review Board
DRL	Documentation Requirement List
DUA	"Demande d'Utilisation Ariane" - Request to use Ariane
ECP	Engineering Change Proposal
EEE	Electrical, Electromechanical and Electronic Parts
EGSE	Electrical GSE
EM	Engineering Model
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
ESA	European Space Agency
ESATRAN	
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
EURD	End User Requirements Document
FAR	Flight Acceptance Review
FM	Flight Model
FMECA	Failure Mode and Effects and Criticality Analysis
FOM	Flight Operations Manual
FOP	Flight Operations Plan
FOV	Field Of View
FRR	Flight Readiness Review
GORD	Ground segment Operability Requirements Document
GRAS	Global navigation satellite system Receiver for Atmospheric Sounding
GS	Ground Segment
GSE	Ground Support Equipment
GSFC	Goddard Space Flight Centre
GSCDR	Ground Segment Critical Design Review
GSDR	Ground Segment Design Review
GSRS	Ground Segment Requirements Specification
GSRR	Ground Segment Requirements Review
GTE	Global Telecommunication Service
HIRS/4	High-Resolution Infrared Sounder
HRPT	High Resolution Picture Transmission
IASI	Infrared Atmospheric Sounding Interferometer

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ICD	Interface Control Document
ICRR	In-orbit Commissioning Results Review
IJPS	Initial Joint Polar-orbiting System
JCCB	Joint Configuration Control Board
JORP	Joint Operations, Rules, and Procedures
LCSP	LEOP and Commissioning Support Plan
LEOD	Low Earth Orbiting Division
LEOP	Launch and Early Orbit Phase
LERR	LEOP Readiness Review
LRPT	Low Resolution Picture Transmission
LSA	Launch Service Agreement
LSI	Launch Service Implementation
LRR	Launch Readiness Review
MRB	Material Review Board
METOP	Meteorological Operational Satellite
MHS	Microwave Humidity Sounder
MTR	Mid-Term Review
NASA	National Aeronautics and Space Administration
NASTRAN	
NCDC	National Climatic Data Centre
NCR	Non Conformances Report
NESDIS	National Environmental Satellite, Data and Information Service
NOAA	National Oceanic and Atmospheric Administration
OMI	Ozone Monitoring Instrument
ORA	Office of Research and Applications
OSDPD	Office of Satellite Data Processing and Distribution
OSV	Operational System Validation
OSVR	OSV Review
PCDAS	EUMETSAT Polar Command and Data Acquisition Station
PDR	Preliminary Design Review
PER	Pre-Environmental Review
PIBS	Polar Information Bulletins
PIP	Program Implementation Plan

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POES	Polar-Orbiting Operational Environmental Satellite
POC	“Plan d’ Opérations Combinées”
PSR	Pre Shipment Review
QRR	Qualification Results Review
RA	Requirement Analysis
RAL	'Revue d'Aptitude au Lancement'
RAR	Requirements Analysis Review
RAV	'Revue d'Aptitude au Vol'
RAMP	‘Revue d’ Analyse de Mission Preliminaire’
RAMF	‘Revue d’ Analyse de Mission Finale’
RD	Reference Document
RDE	Reference Document EUMETSAT
RDN	Reference Document NOAA
RF	Radio Frequency
RFD	Request for Deviation
RFW	Request for Waiver
RID	Review Item Discrepancy
S1RR	S1 Release Review
SAO	System Acquisition Office
SARP	Search and Rescue Processor
SARR	Search and Rescue Repeater
SARSAT	Search and Rescue Satellite-Aided Tracking
SBUV	Solar Backscatter Ultra Violet
SCR	System Concept Review
SCRR	System Commissioning Result Review
SCDR	System Critical Design Review
SDTP	System Development and Test Plan
SEM	Space Environment Monitor
SEV	System Engineering Validation
SEVR	SEV Review
SGICD	Space-to-Ground Interface Control Document
SINDA	
SIU	Satellite Interface Unit
SRR	System Readiness Review / System Requirement Review
S&R	Search and Rescue
SSF	Space segment Simulator Facility



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SSVT	Satellite Simulator Validation Test
SVT	System Validation Test
TCS	Top Coordination Schedule
TEB	Tender Evaluation Board
TRASYS	
TRB	Test Review Board
TRR	Test Readiness Review
TT & C	Telemetry, Telecommand & Control
UIIS	Unique Instrument Interface Specification
UMARF	Unified Meteorological Archiving & Retrieval Facility
U.S.	United States
VCDU	Virtual Channel Data Unit



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APPENDIX C – COORDINATED BASELINE DOCUMENTATION

[CBD 1]	Program Implementation Plan (PIP)
[CBD 2]	Key IJPS milestones
[CBD 3]	EPS Core Ground Segment Interface Requirements on NOAA Ground Segment EPS/SYS/IRD/980916
[CBD 4]	NOAA Interface Requirements on the EPS Core Ground Segment
[CBD 5] to [CBD 9]	reserved
[CBD 10]	Joint Operations, Rules, and Procedures (JORP) Document
[CBD 11] to [CBD 20]	reserved
[CBD 21]	End Item Data Package contents
[CBD 22]	HRPT/LRPT Direct Broadcast Service Specification for the EUMETSAT Polar Mission EPS/SYS/SPE/95413 MO-RS-ESA-SY-0048
[CBD 23]	NOAA Ground Segment to EPS Ground Segment Interface Control Document (To be established)
[CBD 24] to [CBD 25]	reserved
[CBD 26]	AVHRR-3 ICD MO-IC-MMT-AV-0001 (when approved, ad interim use AVHRR UIIS: IS 20029950)

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- [CBD 27] HIRS/4 ICD
MO-IC-MMT-HI-0001 (when approved, ad interim use HIRS UIIS:
IS 2285780)
- [CBD 28] AMSU-A1 ICD
MO-IC-MMT-A1-0001 (when approved, ad interim use AMSU-A1 UIIS:
IS 2617547)
- [CBD 29] AMSU-A2 ICD
MO-IC-MMT-A2-0001 (when approved, ad interim use AMSU-A2 UIIS:
IS 2624483)
- [CBD 30] MHS UIIS (Unique Instrument Specification)
IS 20046415
- [CBD 31] reserved
- [CBD 32] SARP-3 ICD
MO-IC-MMT-SP-0001 (when approved, ad interim use SARP UIIS:
IS 3267401)
- [CBD 33] SARR ICD
MO-IC-MMT-SR-0001 (when approved, ad interim use SARR UIIS:
IS 2295546)
- [CBD 34] SEM/2 ICD
MO-IC-MMT-SM-0001 (when approved, ad interim use SEM UIIS:
IS 3267400)
- [CBD 35] METOP Product Assurance Requirements for NOAA Instruments
MO-RS-ESA-PA-0065
- [CBD 36] Requirement Specification for Instrument (CFI) Thermal I/F Mechanical
Models
MO-MMT-SY-0009
- [CBD 37] CFI Instrument Finite Element Model Specification for System Structural
Mathematical Analysis
MO-MMT-SY-0008

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APPENDIX D – DELIVERABLES DOCUMENTATION

Appendix D-1 NOAA Documents



[RDN 1]	Reserved
[RDN 2]	NOAA IJPS Ground Segment Project Plan
[RDN 3]	POES Program management structure
[RDN 4]	POES System requirements for IJPS
[RDN 5]	Description of NOAA Ground Segment upgrades to accommodate IJPS
[RDN 6]	IJPS Communications Requirements Document
[RDN 7]	NOAA Product generation specifications (if available)
[RDN 8]	reserved
[RDN 9]	SARR-2 End Item Data Package (each model)
[RDN 10]	SEM/2 End Item Data Package (each model)
[RDN 11]	AVHRR/3 End Item Data Package (each model)
[RDN 12]	HIRS/4 End Item Data Package (each model)
[RDN 13]	AMSU-A1 End Item Data Package (each model)
[RDN 14]	AMSU-A2 End Item Data Package (each model)
[RDN 15]	SARP-3 End Item Data Package (each model)
[RDN 16]	NOAA K,L,M User Handbook
[RDN 17]	NOAA Detailed schedule

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- [RDN 18] Satellite to Ground Interface (NOAA-K, L, M)
LMAS IS 3278200
- [RDN 19] NOAA N and N' Performance Specification
- [RDN 20] Performance Specification for the NOAA-N, N' & METOP-1 AVHRR/3
NASA/GSFC S-480-27.3
- [RDN 21] Performance Specification for the NOAA-N, N' & METOP-1 HIRS/4
NASA/GSFC S-480-28.2
- [RDN 22] Performance Operation Specification for the EOS/METSAT Integrated
Programs AMSU-A Instruments
NASA/GSFC S-480-80
- [RDN 23] Technical Specification, Space Environment Monitor
SEL 86-1
- [RDN 24] Technical Specification, SBUV NASA/GSFC/-S-480-12
- [RDN 25] Description of changes to RDN 18 applicable to NOAA-N and N'
- [RDN 26] SARSAT / COSPAS Space Segment Requirement Specification
C/S T.003
- [RDN 27] DCS/2 Technical Specification for NOAA-N
- [RDN 28] A-DCS specification for NOAA-N'

Appendix D-2 EUMETSAT Documents

- [RDE 1] EPS/METOP System Requirement Document
EPS/SYS/REQ/93001
M0-RS-ESA-SY-0010
- [RDE 2] EPS Requirements to U-MARF
EPS/SYS/REQ/97767

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- [RDE 3] EPS Requirements for the KMC/KCE
 EPS/SYS/REQ/97563

- [RDE 4] EPS System Validation Tests Requirements Document
 EPS/SYS/REQ/93001

- [RDE 5] EPS/METOP Mission Objectives Document
 EPS/MIS/REQ/94413

- [RDE 6] EPS Programme management structure

- [RDE 7] Coordinated Baseline Status List (CBSL)

- [RDE 8] EPS Product Generation Specification

- [RDE 9] EPS detailed schedule

- [RDE 10] EPS Core Ground Segment Requirements Document (CGSRD)

- [RDE 11] End User Requirements Document
 EPS/MIS/REQ/93001

- [RDE 12] EPS Product Specification
 EPS/GGS/SPE/96167

- [RDE 13] METOP Satellite to Ground Segment Interface Requirements
 MO-IS-ESA-SY-0025
 EPS/SYS/SPE/95454



- [RDE 14] EPS System Requirements Document

- [RDE 15] to [RDE 18] reserved



- [RDE 19] METOP Space to Ground Interface Specification
 MO-IF-MMT-SY001

- [RDE 20] Performance Functional Specification for the MHS
 EUMETSAT EPS/MHS/SPE/93001

- [RDE 21] MHS End Item Data Package (each model)

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- [RDE 22] A-DCS Specification for METOP 1&2
- [RDE 23] Performance Functional Specification for the IASI
- [RDE 24] Performance Functional Specification for the ASCAT
- [RDE 25] Performance Functional Specification for the GRAS
- [RDE 26] Performance Functional Specification for the GOME-2
- [RDE 27] EPS Encryption System specification
EPS/SYS/SPE/95424
MO-RS-ESA-SY-0049
- [RDE 28] Data Denial Technical Implementation
EPS/SYS/TN/96895

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APPENDIX E – HARDWARE, SOFTWARE, SERVICES DELIVERABLES

Appendix E-1 NOAA Deliverables



Appendix E-1-1 NOAA Deliverable hardware to EUMETSAT

AVHRR/3

<i>Item No.</i>	<i>No. of Del.</i>	<i>Description</i>	<i>Notes</i>	<i>Delivery</i>
1	1	EM instrument (alternatively NOAA may provide an FM instrument to be used as EM/flight spare)		As indicated in [CBD 2]
2	1	FM 1 instrument, tested and calibrated		As indicated in [CBD 2]
3	1	FM 2 instrument, tested and calibrated		As indicated in [CBD 2]
4	1	GSE and packaging items according to [CBD 26]		

HIRS/4

<i>Item No.</i>	<i>No. of Del.</i>	<i>Description</i>	<i>Notes</i>	<i>Delivery</i>
1	1	EM instrument (alternatively NOAA may provide an FM instrument to be used as EM, refurbished as FM2)		As indicated in [CBD 2]
2	1	FM 1 instrument, tested and calibrated		As indicated in [CBD 2]
3	1	FM 2 instrument, tested and calibrated		As indicated in [CBD 2]
4	1	GSE and packaging items according to [CBD 27]		



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AMSU A1

<i>Item No.</i>	<i>No. of Del.</i>	<i>Description</i>	<i>Notes</i>	<i>Delivery</i>
1	1	EM instrument (alternatively NOAA may provide an FM instrument to be used as EM/flight spare)		As indicated in [CBD 2]
2	1	FM 1 instrument, tested and calibrated		As indicated in [CBD 2]
3	1	FM 2 instrument, tested and calibrated		As indicated in [CBD 2]
4	1	GSE and packaging items according to [CBD 28]		

AMSU A2

<i>Item No.</i>	<i>No. of Del.</i>	<i>Description</i>	<i>Notes</i>	<i>Delivery</i>
1	1	EM instrument (alternatively NOAA may provide an FM instrument to be used as EM/flight spare)		As indicated in [CBD 2]
2	1	FM 1 instrument, tested and calibrated		As indicated in [CBD 2]
3	1	FM 2 instrument, tested and calibrated		As indicated in [CBD 2]
4	1	GSE and packaging items according to [CBD 29]		



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SARP-3

<i>Item No.</i>	<i>No. of Del.</i>	<i>Description</i>	<i>Notes</i>	<i>Delivery</i>
1	1	EM instrument (alternatively NOAA may provide an FM instrument to be used as EM/flight spare)		As indicated in [CBD 2]
2	1	FM 1 instrument, tested and calibrated		As indicated in [CBD 2]
3	1	FM 2 instrument, tested and calibrated		As indicated in [CBD 2]
4	1	GSE and packaging items according to [CBD 32]		

SARR

<i>Item No.</i>	<i>No. of Del.</i>	<i>Description</i>	<i>Notes</i>	<i>Delivery</i>
1	1	EM instrument (alternatively NOAA may provide an FM instrument to be used as EM/flight spare)		As indicated in [CBD 2]
2	1	FM 1 instrument, tested and calibrated		As indicated in [CBD 2]
3	1	FM 2 instrument, tested and calibrated		As indicated in [CBD 2]
4	1	GSE and packaging items according to [CBD 33]		

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SEM/2

<i>Item No.</i>	<i>No. of Del.</i>	<i>Description</i>	<i>Notes</i>	<i>Delivery</i>
1	1	EM instrument (alternatively NOAA may provide an FM instrument to be used as EM/flight spare)		As indicated in [CBD 2]
2	1	FM 1 instrument, tested and calibrated		As indicated in [CBD 2]
3	1	FM 2 instrument, tested and calibrated		As indicated in [CBD 2]
4	1	GSE and packaging items according to [CBD 34]		

Appendix E-2 EUMETSAT Deliverables

Appendix E-2-1 EUMETSAT Deliverable hardware to NOAA

MHS

<i>Item No.</i>	<i>No. of Del.</i>	<i>Description</i>	<i>Notes</i>	<i>Delivery</i>
1	1	PFM instrument		As indicated in [CBD 2]
2	1	FM 2 instrument, tested and calibrated		As indicated in [CBD 2]
3	1	GSE and packaging items according to [CBD 30]		